# Agrifood Logistics and Food Traceability

Dr. Ilias P. Vlachos
Agricultural University of Athens, Agricultural Economics Dept., Agribusiness Laboratory, Iera Odos 75, Botanikos 118 55, Athens, Greece
Phone: +30 210 5294757 / Fax: +30 5294767
email: ivlachos@aua.gr /

**ABSTRACT**

Traceability systems are recordkeeping systems designed to track the flow of product and/or product attributes through the production process and throughout the supply chain from producers to consumers. The aim of this study is to review the current status of traceability systems in food companies, compare different traceablity systems applied by food companies, and analyse the sources of variation in their efficiency. A traceability system is characterized by its breadth, depth, and precision. Differences in efficiency are attributed to the costs and benefits of traceability's implementation to these three traceabiligy characteristics. Three case studies were conducted during the period April-May 2005. All cases were large food companies, with more than 250 employees, and operating for more than 20 years in Greece. All companies had a traceability system in operation. All companies had implemented a traceability system not because legislation required, but because they found it was a valuable business tool. In the operation level, the main problem was whether or not suppliers could provide traceability information in a useful format. All companies reported the same benefits from the traceability system: Better control of supply chain as well as better quality assurance –higher levels of food quality & safety.

Keywords: Agribusiness Logistics, Food Traceability, Food Quality & Safety, Honey, Greece

## 1. Introduction

Traceability systems are recordkeeping systems designed to track the flow of product and/or product attributes through the production process and throughout the supply chain from producers to consumers.
Traceability has become mandatory throughout the EU on January 1, 2005 as part of the general food law, so as to address the major issue of food quality and safety and avoid further food crises to emerge. For example, tracking animal feed helps to control the risk of mad cow disease and to improve meat safety.
Traceability also facilitates the targeted withdrawal of foods (reverse logistics) and enables consumers to be provided with information concerning the credence attributes of the implicated products (Vlachos, 2002).
Regulation EC/178/2002 defines traceability as the ability to trace and follow food, feed, and ingredients through all stages of production, processing and distribution.
A traceability system is characterized by its breadth, depth, and precision.

- Breadth describes the amount of information the traceability system records.
- The depth of a traceability system is how far back or forward the system tracks. Regulation EC/178/2002 has made mandatory the plus minus one rule: businesses are at least able to identify the immediate supplier of the product in question and the immediate subsequent recipient.

Precision reflects the degree of assurance with which the tracing system can pinpoint a particular food product's movement or characteristics.
Traceability is related to the supply chain design. In order to preserve high-quality products a sufficient coordination is necessary (Mangina and Vlachos, 2004). For example, Zylbersztajn et al. (2003) studied the competitive structure of the meat system in Brazil and found that coordination was necessary in order to communicate information about consumers' needs of beef products upstream to slaughterhouses and producers.
King (2002) pinpointed that quality products require that specific supply chain design. For example, global markets for products with a strong local identity such as Protected Denomination of Origin products from the EU are expanding rapidly, For example, Kennett et al (1998) examined bread wheat quality and its effect on vertical co-ordination in the wheat supply chain and concluded that the wheat quality control is directly related to supply chain management. In particular, better bread quality requires millers and bakers to develop closer vertical linkages with wheat suppliers Starbird (2001) showed that rewards for better quality and penalties for poorer quality, conditioned by the type of inspection policy, are among the most common quality-related provisions of supply chain contracts. Furthermore, penalties and rewards can be substitutes for one another, thus there exists a unique reward/penalty combination at which the buyer's expected cost of quality is zero (Vlachos, 2004).

## 2. Methodology

Three case studies were conducted during the period April-May 2005. All cases were large food companies, with more than 250 employees, and operating for more than 20 years in Greece. All companies had a traceability system in operation. Cases were named with letters: Alpha, Beta, and Gamma. Personal interviews were conducted with key experts on marketing, supply chain, and traceability. All interviewees were actively involved in the operation of the traceability system.
In each interview, we asked about the company's traceability system, the motivation and consequences of its adoption. We asked about what kind of data are recorded, the use or not information technology, tracking technologies as well as RFID.We also asked about costs and benefits of the traceability system.

## 3. Analysis & Results

As can be seen from the data in Table 1, which reports the cross-case analysis of traceability interviews, all companies had implemented a traceability system not because legislation required, but because they found it was a valuable business tool. In the operation level, the main problem was whether or not suppliers could provide traceability information in a useful format. For example, Gamma had to record trace data for their suppliers because they were small farms. Another problem was the integration of the traceability system with the other

information systems such as accounting and production systems. All companies reported the same benefits from the traceability system: Better control of supply chain as well as better quality assurance –higher levels of food quality & safety

**Table 1 Cross-case analysis**

| | **Alpha** | **Beta** | **Gamma** |
|---|---|---|---|
| **System** | Aberon(WMS) | SAP(WMS) | LogicDis(ERP) |
| **Adoption Motives (by order sign.)** | 1. Complexity of business processes<br>2. Nature of products<br>3. Accounting<br>4. Legislation | 1. Required by Quality Assurance system<br>2. Legislation | 1. Important tool<br>2. Legislation |
| **Upstream** | All products have suppliers' barcode. | Supplier should have traceability. Most products come from large companies that have already barcoding. | They do traceability for their suppliers because they are small farms |
| **Internal** | ▪ Barcode EAN-13 and UCC/ EAN-128 in boxes and palettes.<br>▪ Data: product code & description, number , expire date, pieces per box, weight | ▪ Barcode EAN-13 for piece, EAN-14 for box and UCC/ EAN-128 for palettes.<br>▪ Data: product code & description, number , expire date, serial of shift and factory, pieces per box, weight | ▪ Barcode EAN-13 ITF-14<br>▪ Data: product code & description, number , expire date, serial of shift and factory, pieces per box, weight |
| **Downstream** | ▪ UCC/ EAN-128 | ▪ UCC/ EAN-128 | ▪ For now, only on invoice slip |
| **Problems** | ▪ Integrate information from different departments<br>▪ Errors, omission in warehouse due to poor training of personnel<br>▪ Time Lag | ▪ There are suppliers without EAN barcodes, so there are delays are high risk for errors during material handling | ▪ Most problems in downstream area<br>▪ They need time to study problems more thoroughly |
| **Οφέλη** | ▪ Better control of supply chain<br>▪ Better quality assurance –higher levels of food quality & safety | | |
| **RFID** | ▪ In pilot phase | ▪ Already run a pilot project – still lot to learn. | ▪ They have made a feasibility study |
| **System Performance** | ▪ Industry average | ▪ Above average in terms of responsiveness and accurancy | ▪ They will evaluate it in the forthcoming months. |

## 4. Conclusions

This study aimed to understand better the motives and consequences for food companies of traceability adoption. From a qualitative inquire and in-depth interviews with three large food

companies, we found that although it is a relative new concept, some private companies in Greece, have already developed a significant capacity to trace. Food companies differ in their evaluations about the costs and benefits to determine the efficient breadth, depth, and precision of their traceability systems. Therefore, although traceability is an objective concept, defined by European law, efficient traceability systems is a company-specific concept.

## 5. References


Geiger, C. M., (1998) **Supply chain management: issues and practices for small and rural manufacturers**, The Upper Great Plains Transportation Institute, North Dakota State University, Fargo, North Dakota, Final Report to MPC 97-71A.

Kennett, J., Fulton, M., Molder P., and Brooks, H., (1998) Supply chain management: the case of a UK baker preserving the identity of Canadian milling wheat, **Supply Chain Management: An International Journal**, Vol. 3, No. 3, pp. 157-166.

King, R. P. (2002) **supply chain design for high quality products: Economic concepts and examples from the United States**, 13th International IFMA Congress of Farm Management.

Mangina, E., & Vlachos, I. P., (2004) **Intelligent Optimisation Agents in Food Supply Chain Management**, International Conference On Information Systems & Innovative Technologies In Agriculture, Food And Environment (HAICTA), Thessaloniki Greece, 18-20 March.

Starbird S.A., (2001) Penalties, rewards, and inspection: provisions for quality in supply chain contracts, **Journal of the Operational Research Society**, Vol. 52, No. 1, pp. 109-115.

Vlachos, I. P., (2002) Paradigms of the Factors that Impinge upon Business-to-Business e-Commerce Evolution, **International Journal of Business and Economics**, Fall, Vol. 2, No. 1, pp. 82-89.

Vlachos, I. P., (2004) Adoption of Electronic Data Interchange by Agribusiness Organizations, **Journal of International Food & Agribusiness Marketing**, Vol. 16, Issue 1, pp. 19-42.

Zylbersztajn, D., Pinheiro, C. A., Filho, M., (2003) Competitiveness of meat agri-food chain in Brazil, **Supply Chain Management: An International Journal**, Vol. 8, No. 2, pp. 155 – 165.